

EXPERT-LINE



- **Measuring range:**
Conductivity: 0...2000 mS/cm
Resistance: 0...86 MΩ cm
- **For general-purpose use because of:**
Analogue actual-value output
Alarm relay
Two additional relays
(for use as control contacts)
- **Simple operation with:**
Clear menu structure
Calibration with CAL key
Accessible manual control of contacts
- **Large text display allowing:**
User guidance notes
Error indication
Easy programming
- **Safe operation because of:**
Overvoltage protection
(lightning protection)
Custom alarm configuration for alarm contact and residual current



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Model:
ACM-X

Description

The transmitter ACM-X in a field or panel housing offers convincing solutions for all applications in the area of drinking water-preparation as well as process water and waste-water treatment.

The parameters to be measured (conductivity or resistance) are selected in the menu. The associated measured value can be output to the display in the other measuring mode during measurement. The temperature is shown simultaneously and can be toggled between °C and °F or removed as required.

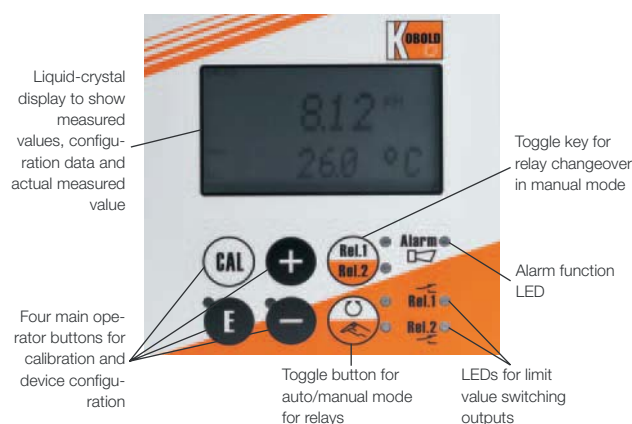
Conductive or inductive conductivity metrology?

Two device versions for measuring with conductive (two-electrode) measuring cells or inductive measuring cells are available. An inductive measuring cell is recommended for concentration measurements or very sticky samples, as this is much less sensitive to coating than conductive measuring cells.

Temperature compensation can operate linearly ($\alpha = 0$ means: without temperature compensation) or as a special high-purity water compensation (NaCl curve) according to IEC 746. The reference temperature is 25 °C.

Different alarms are needed depending on the application and user. Therefore, the transmitter allows the configuration of the alarm contact and the residual current independently of one another and isolated for every possible fault. Unnecessary or undesired alarms can thus be removed. The two additional contacts can be used as limit contacts (and for temperature as well), as P(ID) controllers and for cleaning functions.

The cell constant can be edited and calibrated for special sophisticated applications.



A full view

The actual value and temperature are shown simultaneously on the display. This gives you a full view of the most important process data. Text information in the configuration menu helps to adjust the device parameters.

Intelligent and simple

All operating functions for the device are arranged in a clear menu structure. Individual parameters can be selected easily and changed after entering a code.

Electrical connection

All connections to the panel-mounted instrument are made with terminal blocks at the back.

The entire wiring (including measuring cell cable) for field instruments is connected to terminals in the transmitter connection chamber.

A complete measuring device comprises:

- the conductivity transmitter model ACM-X
- a conductive conductivity measuring cell model ACS-X with integrated or separate temperature sensor Pt 100 model AZT-X
- a suitable conductivity measuring cable model ACK-X
- or
- an inductive conductivity measuring cell ACS-X01
- as well as one of the following options:
- a wall mounting model AZM-X1 or
- a piping mounting model AZM-X2 for the transmitter in field housing (see Accessories)

Application examples for conductivity measurements:

Low conductivity (to 500 µS/cm)

- CIP-cleaning (rinsing dycle in the food industry)
- Monitoring the boiler feed water
- Monitoring and assessing an ion exchanger
- Monitoring the reverse osmosis
- Monitoring the cooling water
- Inspecting the sea water desalinization

Average conductivity (to 10 mS/cm)

- Inspecting the drinking water treatment
- Desalting cooling water
- Waste water inspection in clarification plants

High conductivity (to 500 mS/cm)

- Quality control for drinks (for example milk, beer)
- Control of concentration of acids and lyes (for example CIP cleaning, electroplating plants)
- Detecting phase boundaries (product/water)

Technical Data

Inputs

- Measured quantities: conductivity, resistance, temperature

- **Conductive conductivity/resistance measurement**
 - Measured quantities: conductivity: 0...2000 mS/cm (uncompensated)
 - Resistance: 0...86 M Ω x cm
 - Cell constant range: k = 0.0025...99.99 1/cm
 - Maximum cable length to measuring cell: conductivity: 100 m, resistance: 15 m
 - Frequency: conductivity: 299.75...1077.6 Hz,
resistance: 32.5...425 Hz

- **Inductive conductivity measurement**
 - Measuring range: 0...2000 mS/cm (uncompensated)
 - Cell constant range: k = 0.0025...99.99 1/cm
 - Maximum cable length to measuring cell: 60 m
 - Frequencies: 2 kHz
 - Measuring range for 0 / 4 - 20 mA signal:
 - measured value 0 - 199.9 μ S/cm: min. 20 μ S/cm
 - measured value 200 - 1999 μ S/cm: min. 200 μ S/cm
 - measured value 2 - 19.99 mS/cm: min. 2 mS/cm
 - measured value 20 - 2000 mS/cm: min. 20 mS/cm

- **Temperature measurement**
 - Temperature sensor: Pt 100
 - Measuring range: -35...+250 °C
 - Temperature-offset-range: $\pm$ 20 °C

- **Temperature compensation**
 - Compensation modes: linear, NaCl, table, highpurity water (conductive only)
 - Range: -35...+250 °C
 - Reference temperature: 25 °C

- **Digital inputs 1 and 2**
 - Voltage: 10...50 V
 - Current consumption: max 10 mA

Outputs

● Conductivity/resistance signal output

Current range:	0 / 4 ... 20 mA, electrically isolated
Residual current:	2.4 / 22 mA
Load:	max. 500 Ω
Transmission range:	adjustable
Isolating voltage:	350 V _{eff} / 500 V _{DC}
Overvoltage protection (lightning protection):	according to EN 61000-4-5:1995

● Temperature signal output (optional)

Current range:	0 / 4 ... 20 mA, electrically isolated
Load:	max. 500 Ω
Transmission range:	adjustable, Δ 10 ... Δ 100 % of full-scale value
Isolating voltage:	max. 350 V _{eff} / 500 V _{DC}
Over voltage (lightning protection):	according to EN 61000-4-5:1995

● Auxiliary supply output

Output voltage:	15 V $\pm$ 0.6 V
Output current:	max. 30 mA

● 2 contact outputs (floating changeover contacts)

Current switched under resistive load:	(cos φ = 1) max. 2 A
Current switched under resistive load:	(cos φ = 0.4) max. 2 A
Switching voltage:	max. 250 V _{AC} , 30 V _{DC}
Breaking capacity resistive load:	(cos φ = 1), max. 1250 VA _{AC} , 150 W _{DC}
Breaking capacity under inductive load:	(cos φ = 0.4), max. 500 VA _{AC} , 90 W _{DC}

● Limit value controller

Pickup/OFF delay:	0 ... 2000 s
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● Controller

Function (adjustable):	pulse lengths/pulse frequency controller
Control response:	PID
Proportional band:	Kp: 0.10 ... 10.00
Period for pulse duration controller:	0.5 ... 999.9 s
Frequency for pulse repetition frequency controller:	60 ... 180 pulses/min

● Alarm

Function (switchable):	maintained-contact / fleeting contact; break contact / make contact
Alarm thresholds setting range:	conductivity / resistance / temperature: complete measuring range
Alarm delay:	0 ... 2000 s

Measurement accuracy

● Conductivity measurement

Operating errors of measurement ¹⁾ display:	max. 0.5 % of measurement value $\pm$ 4 digit
Repeatability:	max. 0.2 % of measurement value $\pm$ 2 digit
Operating errors of measurement ¹⁾ :	0.75 % of current output range, conductivity signal output

● Resistance measurement

Operating errors of measurement ¹⁾ display:	max. 0.5 % of measurement value $\pm$ 4 digit
Repeatability:	max. 0.2 % of measurement value $\pm$ 2 digit
Operating errors of measurement ¹⁾ :	0.75 % of current output range, conductivity signal output

● Temperature measurement

Measured-value resolution:	0.1 °C
Operating errors of measurement ¹⁾ display:	max. 1.0 % of measuring range
Operating errors of measurement ¹⁾ :	max. 1.25 % of current output range, temperature signal output

Service environment

Ambient temperature:	- 10...+55 °C (under nominal reference conditions)
Ambient temperature:	- 20...+60 °C (at limit conditions of operation)
Bearing and transport temperature:	- 25...+65 °C
Relative humidity:	10...95 %, non-condensing (nominal reference conditions)
Protection for panel-mounted device:	IP 54 (front), IP 30 (housing)
Protection for field housing:	IP 65
Electromagnetic compatibility:	emitted interference according to EN 50081-1:1992 noise immunity according to 50082-2:1995

Mechanical design

Dimensions of panel-mounted device (HxWxD):	96 x 96 x 145 mm
Mounting depth:	approx. 175 mm
Dimensions of field housing (HxWxD):	117 x 117 x 222 mm
Weight of panel-mounted device:	max. 0.7 kg
Weight with field housing:	max. 2.4 kg (without wall or pipe mounting)
Read-out display:	LC-Display, two-line, five and nine-segment with status indicators

● Materials

Housing of panel-mounted device:	polycarbonate
Front foil:	polyester, fine matt
Field housing:	aluminium, powder coated

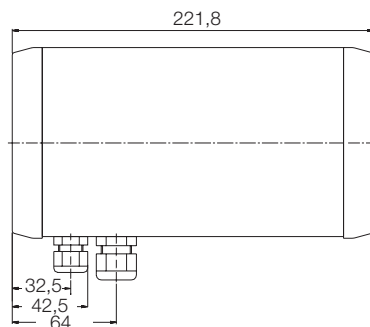
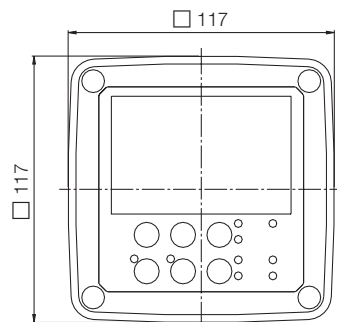
● Auxiliary power

Supply voltage:	100 / 115 / 230 V _{AC} +10 / - 15 %, 48...62 Hz 24 V _{AC/DC} +20 / - 15 %
Power input:	max. 7.5 VA
Supply continuity:	miniature fuse, medium-time lag 250 V / 1 A

¹⁾ according to IEC 746-1, under nominal reference conditions

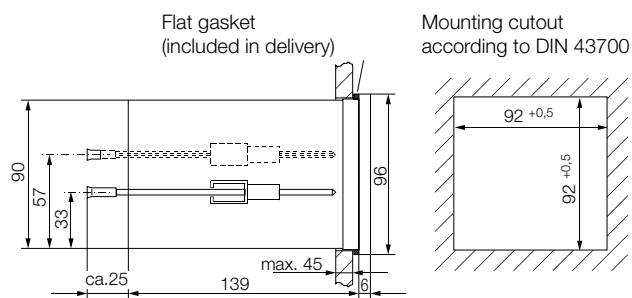
Dimensions

Field housing



Mounting brackets
see page 64

Panel-mounted housing



Order Details Transmitter (Example: ACM-X 2 E 1 S O K)

Model	Contacts	Housing	Power supply	Output	Interface	Metrology
ACM-X	2 = 2 contacts (as limit value contacts or P(ID) controller or timer)	E = housing for panel mounting F = field housing S = field housing with wall mounting bracket (360° rotation) R = field housing with pipe mounting bracket for pipe 2"	1 = 24 V _{AC/DC} 2 = 230 V _{AC} 3 = 115 V _{AC} 4 = 100 V _{AC}	S = analogue output conductivity or resistance T = analogue output conductivity and temperature	O = no additional interface	K = conductive metrology I = inductive metrology